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The Landscape-Gardener and the Architect.

MONSIEUR Edouard André, one of the foremost landscape-gardeners in Europe, not long ago wrote for the *Révue Horticole*, of which he is joint editor with Monsieur Carrière, an interesting article on "Ornamental Buildings for Parks." He seems to feel that the English, with their love for the picturesque in architecture, have attained greater skill in this direction than the French, who are closely wedded to monumental and symmetrical forms of construction. The building in Sefton Park, Liverpool, which is illustrated in the *Révue*, does not, however, seem very excellent to American eyes; and if it is a fair representative of its class we may believe that foreign students could learn much by studying good examples of rural architecture in this country. But the passages to which we invite special attention are those in which M. André speaks in a general way of the relations of the landscape-gardener to the architect. To arrive at the perfect realization of those ideals which should guide in the design of lodges, pavillions, bridges, kiosks, and other buildings needed in a great park, it is needful, he says, that the landscape-gardener should be informed with regard to the principles of the art of building; otherwise he will be in a false situation and his influence will be null. He then proceeds to say:

"I know that here I touch upon a delicate point which has often embarrassed my confrères as well as myself. It has often happened—it happens constantly—that they find themselves in rivalry with architects who are averse to considering the designers of parks and gardens as true fellow-artists, or to treat with them on conditions of amicable equality. If the client, confiding in the taste of the landscape-architect whom he employs, asks him to furnish the architect charged with the construction of the dwelling with ideas relating to the accessory constructions in the park, it happens very often that the latter exhibits an evident, or dissimulated ill-will. Either he will execute badly, if he has no talent, the projects of the landscape-architect, or he will refuse to translate the ideas of another, and will secretly recast these projects in order to impress upon them his personal touch. What is the remedy for this? Plainly to force respect and confidence by one's individual merits. If landscape-gardeners prove themselves to be sufficiently instructed in the art of building; enlightened by an elevated artistic sentiment, the fruit of their studies, their travels, and the comparisons and applications which they have drawn from them; capable of defending their projects to specialists, and able also to carry them well into execution, the opinion of architects will change, and my fellow-workers will advance in public esteem. I may add that our clients and their parks and gardens will likewise profit through a more fitting adaptation of ornamental details to the general effect by means of works in which science and taste will everywhere appear closely united."

Now it is true that the landscape-gardener should know something of architecture. Much of his work in connection with buildings is more closely related to architecture than it is to gardening. But there certainly is an equal necessity that the architect should acquaint himself with the principles of designing gardens and with the landscape-gardener's ideals, processes, and needs. In the discussion which followed the address of Mr. Eliot before the Massachusetts Horticultural Society, from which we quoted at length a few weeks ago, one gentleman argued that the proper way to secure unity in the "house-scene" is for the same artist to design the house and lay out the grounds. But this remark shows an imperfect appreciation of the requirements of both the arts in question. We can conceive it possible for the same person to be skilled in both, but the genius and industry which would be required to master and successfully practice two such complicated arts will rarely be found. What is really demanded is a hearty recognition of the importance of each of the two by the masters of the other, and the development of a spirit of brotherly concord, with an intelligent appreciation of both on the part of the client.

The architect, at least, should know enough of the scope and purpose of landscape-gardening to know that he can be materially aided by an artist trained to look at a building and its surroundings primarily from a different point of view from his own. There need be none of the antagonism suggested by Monsieur André in an associated plan of house and grounds. If a landscape-gardener first makes his study of the ground and suggests the proper location for the house, gives reasons why certain rooms should look in a given direction, and explains why the main entrance should be in a particular place, this need not limit or fetter the architect, but rather furnishes him with a secure basis upon which to make his own studies. In examples of actual practice which have come within our knowledge the result of such co-operation has not only been most successful as a whole, but the architect has recognized the fact that he has been aided to do more effective work in his special department. If either artist is consulted before the other, the landscape-gardener has the prior claim, especially when the grounds are of considerable size or when they are rugged and broken, as they are apt to be in the suburbs of eastern cities after the smoother and more regular lots have been occupied. We recall one instance where the approach-road to a suburban villa was constructed before an architect was selected. But, of course, the preferable method is to associate the landscape-gardener with the architect in the preliminary studies, so that there will be no discord between the designs of the dwelling and of its surroundings, but a unity of purpose which will not only make the place more attractive to the eye but more completely adapted to the wants of its owner.

It should be added that co-operation of this kind saves expense. By this we mean more than is meant by the mere statement that it pays as certainly to secure the advice of a landscape-gardener as it does to employ an architect. What a competent artist gives is always worth more than it costs. But, besides this, there will be usually found a direct saving in matters of construction—even in details of the building, and especially the adjuncts of the building. How much might have been saved is too often measured by the costly work which needs to be done when

the landscape-gardener is called in and asked to adjust its surroundings to a house after it has been built. This attempt to correct errors that might have been avoided is the most unsatisfactory and thankless of tasks. Too often these mistakes are beyond any sufficient remedy, or the expense of even partial correction may be excessive, and in either case the reputation of the artist and his art is unjustly called in question.

The *American Cultivator*, of Boston, under the title of "Practical Forestry," publishes some remarkable statistics from the pen of Mr. John D. Lyman, of Exeter, New Hampshire. "Taking," he says "the present forest-area of the United States as given in the latest reports of the Agricultural Bureau, and leaving the vast forest-covered regions of Alaska out of the question, and only reckoning 5,000 feet board measure to the acre, and assuming that our population is now 60,000,000, we have now ready grown and fit to cut 40,500 feet of lumber to every man, woman and child in the United States, or 222,700 to each family." Of the lands considered forest-covered, in the returns made to the Department of Agriculture, a considerable portion, such, for example, as the wood-lots connected with farms in most of the settled parts of the United States, contains no merchantable timber whatever; while in those sections of the country, still little changed by settlement or cultivation, the stand of timber over large areas of so-called forest does not average anything like 5,000 feet to the acre. Mr. Lyman must have discovered somewhere within the limits of the United States some unusually heavy timber to bring up his average to his moderate amount of 5,000 feet an acre. We should have supposed fifty feet an acre, taking the whole area covered with trees, to be nearer the mark. But Mr. Lyman is evidently accustomed to big timber, for he goes on to doubt, speaking of economic tree-planting in Massachusetts, if there is a man "in the state who has grown from seed or from trees set out 50,000 feet, or even 25,000 feet, of good timber to the acre." As it is less than sixty years since the first large plantations were made in Massachusetts, Mr. Lyman is probably correct. But such statements are hardly necessary to enforce Mr. Lyman's position that "the timber-crop per acre can be increased by the practical arts of forestry, the same as our grain supply has been increased, simply by knowing how to do it. The work, however, needs to be done on existing forests, and on lands adapted by nature to forest-growth." No one who has studied the forest-question in the United States will now deny that the care and improvement of existing forests, growing upon lands unfit for any purpose but the production of timber, is vastly more important than the creation of new forests by planting trees on lands adapted to other crops of more immediate productiveness. But while the forests are being made more productive, there is not a family in the United States, which will not feel happy at the thought that its quota of merchantable lumber is 222,700 feet board measure.

Drives and Walks.—II.

IT has been shown that, except in rare cases which are not likely to occur at all in this country, it is better that the approach to a country house in a place of any size should be curved rather than straight; but also that it should not meander about in an irrational way, injurious alike to convenience and beauty. It should not look as though the display of the various beauties of the property or the formation of graceful curves were its main object, while the the conveyance of visitors to their destination was a secondary one; nor, on the other hand, should it be laid in a mathematical line, straight towards this destination, with a rigid disregard for surrounding objects. A happy mean between these two extremes is what is wanted—a line that is direct enough to seem sensible, and yet curved enough to be beautiful as well as easy for wheels.

Sometimes its bends will be dictated by conspicuous irregularities in the surface of the ground, or by existing trees, which it is desirable to preserve. Then they will be evidently rational, and, if well drawn, entirely pleasing to the eye. But sometimes there will be no such reasons for curvature, and yet curvature will be necessitated by convenience in driving and the general desire to avoid too stiff a line. In such cases a good landscape-gardener will make the curves seem natural by some device of his own—by altering the surface of the ground or by planting. When his work is done, and time has assisted it a little, the effect should be the same as though nature had prescribed the line of his drive. The road may have been the first consideration, and the objects which govern its course merely later adjuncts; the curve may have been the necessity, the hillock, the tree, or the group of shrubs a device to excuse it. But the eye need not realize the fact—the surface irregularities and plants may be made to seem the cause, and the curve the natural consequence. To secure such a result is one of those artifices which are inexcusable if they fail of the right effect, but which are the highest art—the art which conceals art—if they produce this effect. It is an artistic defect to make too palpable an attempt to disguise the utilitarian character of a road as a means of transit from one given point to another; but it is an artistic triumph to make it look as though, while affording such transit with reasonable directness, it had chanced to take a course that is beautiful, too. Of course, while the careless observer will be deceived by the apparent naturalness, and its methods and results, the student of art will know that chance has had nothing to do with the matter; but his eye will accept the appearance of happy accident and his mind will enjoy it all the more for knowing that the hand of an intelligent man has been at work.

But to make the curves of a drive look natural it is not sufficient that they should have some visible reason for existing. The objects which supply the reason must themselves look natural or the artificiality of the whole arrangement will at once be plain. To throw up a hillock or plant a tree or a group of trees or shrubs in a spot where it will deflect the road will be futile, unless it looks as though, for other reasons, it ought to be there, and to look thus it must compose well with the features around it and play an acceptable part in the general aspect. The hillock must blend and harmonize with the general conformation of the ground, and the plants must form agreeable masses—not too large for their places, nor so small as to look as though they had been dropped down by accident—and must usually be supported by other plantations in their vicinity. On a lawn, which is large enough to be crossed by a road at all, there will be space for other trees and shrubs besides those which may immediately border the road; and all should be so arranged that the eye will be convinced that if the individuals which seemingly force the road to curve had been removed the effect of the remainder and of the prospect as a whole would have suffered. They should seem to have stood, before the road was built, in places where they were needed as items in an harmonious picture; and the road should seem to have respected them for this reason. Nor is it needful that every deflection in the road should be excused in just this way. For example, the approach may diverge to the right to avoid a beautiful tree; if it must then turn again to the left to reach the house in a convenient and pleasing way, this fact is its own sufficient explanation and excuse.

Whatever the objects chosen to justify the bends in a road, they should not be flower-beds. Anything which forces a carriage to turn from the direct path should be a real and a permanent obstacle—something over which wheels could not pass, and which could not be removed without destroying it. To make a flower-bed play the part of an obstruction to vehicles gives a deplorable look of triviality and wilfulness; yet there are few objects so often seen in the bend of a road that crosses a lawn. The truth, probably, is that the road has been curved without thought of supplying a reason for the curve, simply because it could not be carried straight or because of a belief that a curve, managed in any way, would be beautiful; and then the flower-bed has been thought of because the elbow in the grass seemed to offer a "good place" for it. But its trivial, ephemeral nature is not the only reason why a flower-bed is unsuitable in such a position. A lawn which is large enough to be crossed by a road has a somewhat park-like character, and in a park-like landscape a flower-bed is utterly out of place. The crude bright spot it makes is disagreeable enough in a small expanse of lawn, but doubly disagreeable when there is so much space that an effect of broad unity, of rural repose and peace might be secured. And where a flower-bed is out of place, so, too, of course, are small, isolated plants, and especially those which have evidently been brought from the green-house and must soon be returned to it.

The Art of Gardening—An Historical Sketch.

X.—Greece (Continued).

FROM what has already been said with regard to the paucity of descriptive writing of any kind among the Greeks, it will be understood why it is difficult to divine just how their gardens were disposed. That they were largely formal in arrangement cannot be doubted. Such was clearly the case in public gardens like the Academy and Altis at Olympia; and the nature of the Greek mind, the way in which it conceived all kinds of beauty, indicates that the art which entirely conceals art could not have been its ideal even in the most private pleasure-ground. But by a Grecian orderliness and balance we need not understand an Egyptian rigidity of design. A certain measure of symmetry and architectonic dignity must have been desired; but grace, too, was essential to the Greek, and the symmetry he loved did not exclude variety. Even a discreet degree of picturesqueness may well have added charm to his garden effects, as is implied, indeed, by the fact that grottoes were used no less than formal basins in which swans disported themselves. From the character of his other works of art we may believe that he planted his trees now in parallel lines, but now in well contrasted varied groups; that he never clipped them into unnatural shapes, and never objected to a graceful irregularity of growth if it did not pass into patent eccentricity or combine in awkward ways with the omnipresent architectural forms.

The favorite ornamental tree with the Greeks was the Plane, on account of its thick, wide-spreading shade. The Pine and the Cypress stood next in favor as garden-trees. The funereal significance of the Cypress, recognized by all the ancient peoples, as well as by the Orientals and Europeans of our day, probably had its origin in Persia. Here it was believed that the first Cypress came direct from heaven to Zoroaster, and the tree was regarded with peculiar reverence as symbolizing by its pyramidal shape the flames which were worshipped as themselves the emblem of the "principle of light." In Greece, as elsewhere, the Cypress was constantly planted by tombs, and was prominent along those suburban streets which were lined with the monuments of the honored dead. But it was thought no less appropriate for pleasure-gardens, where its formal outlines harmonized well with architectural features. It appears, too, that tombs were sometimes placed in gardens. Lycurgus, the orator, is said to have been buried in a private garden at Athens.

The Oak was another favorite and sacred tree; so, too, the Poplar. The reverence bestowed upon the Olive, and its part in the story of the founding of Athens, need hardly be referred to. But it may be explained that Olives and fruit-trees of all kinds were regarded by the ancients as garden-trees, and often formed the temple grove. No such line as we draw to-day was then drawn between useful and ornamental trees, or even, it seems, between vegetables and flowers. Plutarch even declared that the best way to show the beauty of Roses and Violets was to plant them, for contrast, among Cabbages and Onions. No shrub was more beloved in Greece than the Myrtle and the Laurel, needed for many religious rites, and no flower more than the Violet, the flower of Athene, the emblem of Athens itself, the "City of the Violet Crown."

It is impossible to decipher from the curtness of contemporary records just where or how flowers were grown for sale in Greece, although mention is made of their cultivation near temples, and flower-markets were held at stated intervals in the squares of Athens. It was only in later days, however, that they were profusely used. The simple taste of early times desired no more striking ornament than a crown of leaves. Coronals of flowers, says Pliny, were not employed until about the 100th Olympiad—B. C. 380. Nor at any time had the Greeks a great variety of flowers. Roses, Lilies, Hyacinths, Violets, and the blossoms of fruit-trees and shrubs were those with which they were most familiar.

By the time of Alexander, the Persian love for gardens and parks, with many other forms of luxury, had obtained a strong foothold among the Greeks, especially in their wealthy colonies; and wherever the conqueror's footsteps are followed we read of admiration for the works of the Persians and of a desire to imitate them in new constructions. When Harpalus was left governor of the province of Babylon he was desirous, says Plutarch, "to adorn the palace gardens and walks with Grecian plants, and succeeded in raising all but the Ivy, which the earth would not bear, but constantly killed."* When the city of Alexandria was laid out "in the form of a plethrum or military cloak," its vast palaces and public buildings were surrounded with squares and gardens to such an extent that, buildings and grounds together, a third of the space within the walls was absorbed. Dinocrates (or Dinochares) was the architect to whom the work was confided; and it was he who conceived the idea of carving Mount Athos into a statue of Alexander "with a city in the right hand and a reservoir of mountain streams in the left." Is such a scheme entitled to be ranked among landscape-gardening designs? And if not, where shall we place it? for it can hardly be called engineering, since beauty, not utility, was the main object in view. At all events it remains the most ambitious idea that was ever conceived with regard to the adornment of the surface of the earth.

Lucian tells us that at Cnidos there was a great pleasure-ground dedicated to Venus, where even "distinguished citizens" enjoyed themselves on the verdant meadows, and where the common people came in crowds on holidays; and he mentions its Cypresses, Planes and Myrtles. In Sicily, where luxury went hand in hand with tyranny, gardening seems to have been practised in an especially sumptuous way. Dionysius of Syracuse had famous gardens where his feasts were held; one of the Hieros built a war-galley in which the poop-deck was covered with earth and beautifully planted; and some modern writers have thought that the famous quarry-pits near Syracuse, where the Athenians perished in agony, were afterwards planted as pleasure-gardens.†

About 300 years before Christ, Kotys, King of Thrace, "took his pleasure by a cool stream" in a forest through which he had built "level roads." A hundred years later, near Athens itself, Herodius Atticus possessed a villa surrounded by large forests, which is spoken of by Aulus Gellius in his Attic Nights; and when Xenophon retired from his native country to Scillus, near Olympia, he erected an exact copy, on a smaller scale, of the temple of Diana at Ephesus, surrounded it with a similar "grove of cultivated trees bearing whatever fruits are eatable at the different seasons," and had spacious hunting-grounds in its vicinity.

New York. *M. G. van Rensselaer.*

* "But such digressions," adds Plutarch, "the impatient reader will be more willing to pardon if they are kept within a moderate compass." The modern reader would be less impatient if the compass had been wider! Diodorus, by the way, tells that when they were returning from India, where likewise the Ivy did not grow, Alexander and his body-guard made a long excursion to see a mountain where it flourished, and spent a day in Bacchic ecstasies and banquets, so great was their pleasure at beholding it again—a statement which certainly implies a strong love for the beautiful products of nature.

† Franz von Löher: "Sizilien und Neapel." For a description of the present aspect of these quarries and their luxuriant vegetation see Symonds's "Sketches in Italy and Greece."

Notes Upon Some North American Trees.—X.

172. MYRSINE RAPANEA, Rœm. and Schult. This plant does not appear to assume anywhere in Florida an arborescent habit, and there seems no reason for retaining it in the American Silva.

180. BUMELIA SPINOSA, A. DC. Professor Gray, in the second edition of the "Synoptical Flora of North America," reduces this so far as relates to the Texas and Arizona plant to a variety of *Bumelia lanuginosa*,—the var. *rigida*.

182. BUMELIA CUNEATA, Sw. The Florida and west Texan tree, which has been referred to this species of Swartz, is not, it appears (Gray, *l. c.*), that plant; and Professor Gray has, therefore, taken up for it Nuttall's name, *B. angustifolia* (Sylva iii., 38, *t.* 93). *Bumelia reclinata*, Torrey (Bot. Mex. Bound. Surv.), not of Ventenat, a small tree of the Rio Grande Valley (Havard in *Bull. U. S. Nat. Mus.* viii., 510) is referred to this species.

FRAXINUS CUSPIDATA, Torrey. This handsome Ash of the section Ornus must find a place in the Sylva immediately before *Fraxinus Greggii*. Often a shrub, especially towards the northern limits of its distribution, in Texas, notably in the mountain cañons of Chihuahua it becomes a handsome tree, with a trunk six to eight inches in diameter (C. G. Pringle, in GARDEN AND FOREST, i., 142); and I have seen it nearly of the same size in the neighborhood of Saltillo.

189. FRAXINUS GREGGII, Gray. This species is abundant on the high slopes of the Sierra Madre, near Monterey, where it becomes sometimes a handsome small tree. Our illustration upon page 451 of this issue, made from a photograph taken last summer by Mr. Pringle in these mountains, will serve to give an idea of the habit of this tree and of its surroundings on the Sierra Madre.

199. FORESTIERA ACUMINATA, Poir.—This plant, which I have seen growing with great vigor and luxuriance in different places in western Louisiana and in eastern Texas, hardly merits the title of tree, which was given to it in the Census Catalogue. It is rather a tall, broad shrub, with slender, spreading and recurving branches. It may be properly dropped from the Silva of North America.

Forestiera reticulata, Torr., is reported by Dr. V. Harvard to grow as a small tree on the rocky slopes of the great cañon near the mouth of the Pecos River.

216. NECTANDRA WILLDENOVIANA, Nees. The oldest name of this plant seems to be *Laurus Catesbyana*, Michaux (Fl. Bor. Am., i., 244), for the *Laurus sanguinea* of Swartz (Fl. Ind. Occ., ii., 707) includes, according to Meisner (Prod., xvi., 165), two different plants; and it does not appear that *L. cyathifera*, Vahl. (Meisner, *l. c.*), has been published. *Nectandra Catesbyana* would seem, therefore, unless some older specific name can be found, to be the one to adopt.

219. DRYPETES CROCEA, VAR. LATIFOLIA, Müller. This is a very different plant from *D. crocea*, with snow-white bark, larger, thicker, and more lustrous leaves rounded at the apex, flowers with a single stigma, and oval, large white fruit an inch long, so that the original name of Vahl. (Eclog. Amer. 2, 119) *Drypetes glauca*, to which it was correctly referred by Nuttall (Sylva ii., 68) must be restored to it.

220. SEBASTIANA LUCIDA, Müller. The perianth of the male flowers is rudimentary in our plant, so that it must be restored to Gymnanthes, and so becomes *Gymnanthes lucida* of Swartz, the first name under which it was described.

223. ULMUS FULVA, Michx. Walter's *Ulmus pubescens* has been considered to be this species. The name is much older than that of Michaux, but Walter's characters leave it uncertain what plant he had before him, and his name cannot safely be taken up.

229. FICUS AUREA, Nutt. A specimen in the Kew herbarium collected by Brace (No. 356) in New Providence in 1879 shows that this common south Florida tree is also, as was to be expected, an inhabitant of the Bahamas.

230. FICUS BREVIFOLIA, Nutt. There appear to be only two indigenous Fig-trees upon the Florida Keys, *F. aurea*, with leaves pointed at both ends, and sessile, or nearly sessile, fruit, and a plant with cordate leaves and small, flattened pedunculate fruit, which is first yellow, but becoming scarlet at maturity. The peduncles vary considerably in length on the same plants. It is represented with yellow fruit in Nuttall's Sylva as *F. pedunculata* (*t.* 41), and with red fruit on shorter peduncles as *F. brevifolia* (*t.* 42). But the *F. pedunculata* of Nuttall is not the *F. pedunculata* of Aiton, but the *F. populnea* of Willdenow (*vide* Herb. Kew), the name which, unless some older one can be found for Willdenow's plant, must include *Ficus pedunculata* and *F. brevifolia* of the Census Catalogue and of Chapman's "Flora of the Southern United States."

232. MORUS RUBRA.—The variety of the Red Mulberry, first described by Rafinesque (Flora Ludoviciana, 113), with the under surface of the brighter green leaves covered with white tomentum (although the fruit is certainly not white, as Rafinesque described it),—the var. *tomentosa*, Bureau in DeCandolle's "Prodromus," xvii., 246, is common in western Texas. This is the large Mulberry-tree which abounds on the banks of the San Antonio River near its source; and I have collected it at Bœrne, on the Guadaloupe. The large Mulberry-tree (probably planted) in the Public Square at Laredo, on the Rio Grande, is of this form.

233. MORUS MICROPHYLLA, Buckley.—This Texas plant is not distinguishable from the common Mulberry-tree of Mexico and Central America, *Morus celtidifolia*, HBK, which is very common in the valley of the lower Rio Grande south of the river; and Buckley's name should disappear except as a synonym, although the Texas plants, as is natural, have generally smaller leaves than those on trees growing in the moister and more fertile Mexican valleys.

C. S. Sargent.

New or Little Known Plants.

Aster Lindleyanus.

THE handsome Aster which is figured for the first time upon page 449 of this issue is one of the latest additions to the flora of New England, having been first detected within its borders three years ago by Mr. Faxon, at Shelburne and Franconia, in the White Mountain region, and last year by Mr. E. L. Rand on the Island of Mount Desert, off the coast of Maine.

*Aster Lindleyanus** is a showy species, with stout stems ten to twenty inches high, the lower leaves ovate and obscurely cordate, with winged petioles, the upper oblong-lanceolate, the uppermost sessile and acuminate at both ends. The flowers, with pale violet rays a quarter to nearly half an inch long, are large and comparatively few, in loose panicles terminating the stems. This species is found from Labrador to the northern shores of Lake Superior, the Saskatchewan and the borders of British Columbia. It was first made known many years ago, from plants raised in England from seeds gathered in Labrador, but it has probably long ago disappeared from gardens.

Foreign Correspondence.

The Lindens for City-Planting.

THIS is the first warm summer we have had for many years. Grapes ripened before the month of August, and rye was harvested before the end of June; and, in places where the rains have not failed, vegetation is extraordinarily rich and luxuriant. I have never seen the Ash and the Oak more brilliantly decked with green. But there is a reverse to the medal. In the streets and public squares of Berlin, the Lindens, one of their chief attractions, present the sombre spectacle of a premature autumn. Their foliage, browned and withered by the heat of the sun, is already falling. The tree which has proved itself best adapted for city-cultivation—the tree so delightful for the richness of its verdure and its bloom in spring and early summer, seems no longer able to play its part in great centres of population. Yet, is it wise to banish the Linden from our cities and substitute everywhere the Elm, as some suggest? Let us consider the question a little.

Many people—I may say most people—know of but one Linden. Among us, the most common and most widely cultivated is *Tilia intermedia*, *DC.*, commonly known as the Dutch Linden, since the Holland nurseries supply it in abundance. It possesses every good quality of the genus, but is extremely susceptible to heat. Even artificial watering fails to preserve its greenness. The same is true of *Tilia platyphylla*, Scop. Each of these species has a period of extreme beauty, lasting some months, which is followed by one of melancholy decadence. This again, toward the autumn, gives place to a partial re-leafing, never, however, as in the case of the Horse-chestnut, carried to the point of a second blossoming within the year.

For its ornamental qualities *T. ulmifolia*, so common in its wild state in the north of Germany, is superior to its congeners. It has not their fine flowers and foliage, and it falls behind them in growth, but it better resists heat and drought. To be convinced of this I have only to look out of my window upon Leipzig Square, where stand the noblest Lindens of Berlin. The leaves of this species are of a bluish tint. Looking at a single specimen, almost lost among the crowd of its neighbors, I am forced to concede to it a superiority in some respects. This particular specimen has also lost some of its leaves, but it is not an eyesore like most of the others around it, which, besides their suffering from drought, have been preyed upon for two years by voracious caterpillars (*Bombyx dispar*, *Daschyra pudibunda*, and a third species, whose name I do not know). I remember having noticed similar ravages among the trees in 1883, when, as early as the beginning of July, a long drought caused the blossoms of the Dutch Linden to fall in such quantities that they were swept away in heaps. The proper remedy for this trouble is not found in the substitution of another tree for the Linden, but in the employment in future plantations of a Linden different from the species now generally planted.

The species I recommend is the Crimean Linden (*T. dasystyla* = *T. euchlora*, K. Koch). Little known as a wild tree, it

*Aster Lindleyanus, Torr & Gray, *Flora N. Am.*, ii, 122—Gray, *Syn. Flora*, i. 2, 182.

Fig. 127.—Aster Lindleyanus.—See page 448.

began to find its way into Germany about twenty years ago. It grows rapidly. Its top, while young, assumes a broad pyramidal form. The stout texture of its leaves, and their glossy surface, seem to have predestined it for intra-mural plantations. The specimens which have come under my observation have remained unharmed, while other Lindens have suffered seriously. It would be advisable to make a trial of the Crimean Linden in America, where its advantages

would, probably, be even more apparent than they are here.

The beauty of all Lindens is great and incontestable. In the case of the Crimean Linden, this beauty is heightened by the lustre of the leaves, which resemble those of the Beech. It also has the advantage of blooming as late as the last week in July. The tree must attain a considerable age before it blooms, which it did in Berlin for the first time in 1873. My trees at Scharfenberg are fruiting well this year, and we shall have an abundance of seed.

We have here, also, some specimens of a variety of *Tilia platyphylla*, which is remarkable for the yellow color of its young branches and buds, a peculiarity which disappears in summer, but is very noticeable in winter and early spring. This is the variety known as Aurea. I mention it here because I have learned something as to its origin. It was discovered before 1829 in a forest of Alsace, near the outskirts of Bollwiller, by M. Baumann, who also first distributed it.

Berlin. *C. Bollé.*

Cultural Department.

Notes on Hypericums.

THE Hypericums, or St. John's-worts, embrace more than 160 described species of herbaceous and woody plants, and there are, probably, a good many more still unknown. Of the known species only a comparatively small number are of much value to the florist or gardener, although all may be interesting or beautiful from the botanist's point of view. Except in very rare cases, in which the blossoms are white, the flowers of all the species are yellow, and they vary in size from very minute ones on slender annuals, an inch or two high, to the large golden yellow blossoms, several inches in diameter, of some of the cultivated species.

They are chiefly found in North America, Europe and Asia; but a few are tropical, and some inhabit the southern hemisphere. In Europe a few of the tender species are thought worthy of green-house culture. The name of St. John's-wort is said to have been derived from the fact that the common people of some European nations, especially the English and Germans, used to gather large quantities of the flowers and ornament their dwellings with them on St. John's Day, as a supposed protection from evil spirits. The species chiefly used for this purpose and to which the name was first given was the common St. John's-wort (*Hypericum perforatum*), which is found all over Europe and a large part of Asia, and which, having become naturalized in America and spread over a large area, is now looked upon here as a troublesome weed. It is a perennial herb, and when in full bloom is certainly as handsome as some of the occasionally cultivated herbaceous or half-shrubby species. The deep yellow flowers, in large corymbs, are over an inch in diameter and crowned with many stamens, and the leaves have very distinct pellucid dots, which are plainly seen when held up to the light. These dots on the leaves are characteristic of this genus, but they vary in number and size on different species, and are often black instead of pellucid. They secrete aromatic resinous juices and a volatile oil.

The Hypericums are generally not difficult to cultivate and propagate, yet very few classes of hardy ornamental plants are so little known and so poorly represented in American gardens generally. Some of the group are particularly valuable, because they flower after most shrubs and early summer-blooming perennials have past their best condition, and before other autumn flowering kinds have developed much of their efflorescence.

A number of shrubby and half-shrubby species of Hypericums, grown in England and the warmer parts of Europe, cannot be relied upon for hardiness to withstand the winters of our New England or Northern states. But among those tested at the Arnold Arboretum are some which are thoroughly satisfactory, and others that have promised well in the short time that they have been in the collection. They have been grown in an exposed situation where there was little protection in winter and no shade in summer, and where it was, perhaps, too wet in winter and spring to give the best results.

Of the low-growing, half-woody species, *Hypericum calycinum* is decidedly the most interesting and satisfactory. The stems are less than a foot high, and although killed back to the ground every winter, new flowering shoots arise from the creeping, woody rootstocks. The large, smooth, green leaves are ovate or oblong, and have very small, pellucid dots. Rarely more than one flower is developed at the top of each stem. The handsome flowers are bright yellow, from two to three inches in diameter, and crowned with many long stamens. This species is easily propagated by root-cuttings, or cuttings of ripe wood in late summer. The roots spread and ultimately make large clumps, and the plants will thrive very well either in the open sunlight or under trees, if the soil is not too poor. In the Arboretum this Hypericum begins to flower early in July, is in its best condition during that month, and bears a few flowers in August, or even later. It is a native of south-eastern Europe. This and all the other Hypericums bloom later and for a longer time if grown in a cool, partly shaded place.

Hypericum hircinum, though not so handsome as the preceding species, is a very free bloomer and is easily cultivated. The stamens are very long and of varying length, the longest being about one and one-half times the length of the broad, pale yellow petals, which are three-quarters of an inch long. The stems are killed almost to the ground in winter, and come up again each year to nearly two feet in height. It begins to flower about the second week in July and continues until near the end of August. The form known as the Minor variety is simply smaller and more compact in every way, and it seems to flower somewhat later.

H. multiflorum grows taller than the last species, which it much resembles in foliage and flower. It is more shrubby, but its blooming season is shorter, lasting for only about two weeks in July.

H. oblongifolium, a native of high altitudes of the Himalayas, has not proved very hardy, but should be further tested. It has large leaves and very handsome, golden-yellow flowers from two to three inches in diameter. Another Asiatic species is *H. patulum*, with somewhat smaller leaves and flowers. It has usually proved hardy, but, with some others, was killed last winter. *H. Androsæmum*, the Tutsan or Sweet Amber of England, requires further proof of hardiness before it can be recommended here. Some of these species, as well as some others, may thrive with little care in the climate of the middle states or further south, but here they require a good deal of protection in order to give very satisfactory results.

But among the thirty known North American species are several which are perfectly hardy and also very bright and effective as ornamental garden shrubs. By far the best of these is the beautiful *Hypericum aureum*, of which a description and figure were given in a recent number of Garden and Forest (pp. 184 and 185). In cultivation it is a bushy, very much branched shrub, three to four feet high, and often more in diameter. Several flowers are usually produced on the end of each branch and branchlet, although in a wild state the flowers are often solitary. The flowers are an inch and a half, or sometimes nearly two inches in diameter, and the petals are very thick and firm, and pale yellow or orange in color. The stamens, of which a careful count shows a thousand in a well-developed flower, are a little more than half the length of the petals, and of a golden-yellow color. When the flower is first open the stamens are so arranged that they have a beautiful dome-like shape, but, after repeated visits by bumble-bees, which eagerly collect the pollen, the stamens lose their anthers, become more spread out, and have something of the appearance of a broad square-faced brush. The color gradually changes to an orange-brown, and after the third or fourth day the filaments become brown and are ready to fall with the first wind or rain. Although a native of Tennessee and other southern states, this species proves perfectly hardy about Boston, where it continues blooming from the first or second week in July until the middle of August, or later if the plants are young, or are grown in a moist or partly shaded place.

Hypericum prolificum is a species found from New Jersey southward, and also westward in Minnesota, Illinois, etc. It is the American species which is perhaps most commonly cultivated in European gardens. Between this species and *H. Kalmianum* there appears to be no very great choice as to ornamental value. The latter was originally found in the vicinity of Niagara Falls, and extends over the region about the Great Lakes, and within a few years it has been reported from Middle Tennessee. In its native habitat it varies in size from a few inches in height in exposed places to a couple of feet or more in favorable situations. In cultivation it will grow about as large as *H. prolificum* which attains a height of three feet or more. Both species are quite hardy. Perhaps *H. Kalmianum* being found so far north would do best in localities where the winters are very severe. The leaves are narrow, one or two inches long, and the thin petalled golden-yellow flowers are about an inch across, and produced in single or compound clusters at the ends of the branches. The leaves of *H. prolificum* are usually larger, and the flowers more numerous, though somewhat smaller, than

in *H. Kalmianum*. Botanically the chief distinctions between these two species are the five styles and five-celled capsules of *H. Kalmianum*, and the three styles and three-celled capsules of *H. prolificum*, but, in cultivated seedlings, these divisions appear to be by no means constant, and the capsules of specimens grown as *H. Kalmianum* are sometimes three, four, five, or six-celled on the same plant or branch.

These two species and *H. aureum* have been grown together in the Arboretum, and the seedlings produced from them have shown a tendency to variation, which seems very strongly to indicate hybridization. This might result from the work of bumble bees, which, in collecting the pollen, fly indiscriminately from one species to another. These plants do not seem to be very long lived and though they may do well for eight or ten years, or more, renewals should be made every six or seven years. Young plants from seed may begin to flower the second year if well grown. With a little trouble they may be propagated by cuttings, and in this way a particularly fine form might be best perpetuated.

Hypericum densiflorum is closely related to *H. prolificum*, of which it was classed as a variety in Gray's Manual. It is said to grow five or six feet high and to have more numerous, though smaller flowers. *H. Buckleyi*, a rarer species, is found in the mountains of North Carolina and Georgia, and is described as a branching shrub about a foot in height with flowers about an inch across. These two species have not yet been grown at the Arboretum. They will probably be quite hardy, but, horticulturally, not an improvement upon, or more desirable than the species already cultivated. *H. fasciculatum*, a plant three to six feet in height, has extremely narrow leaves. It has not yet been tested thoroughly at the Arboretum.

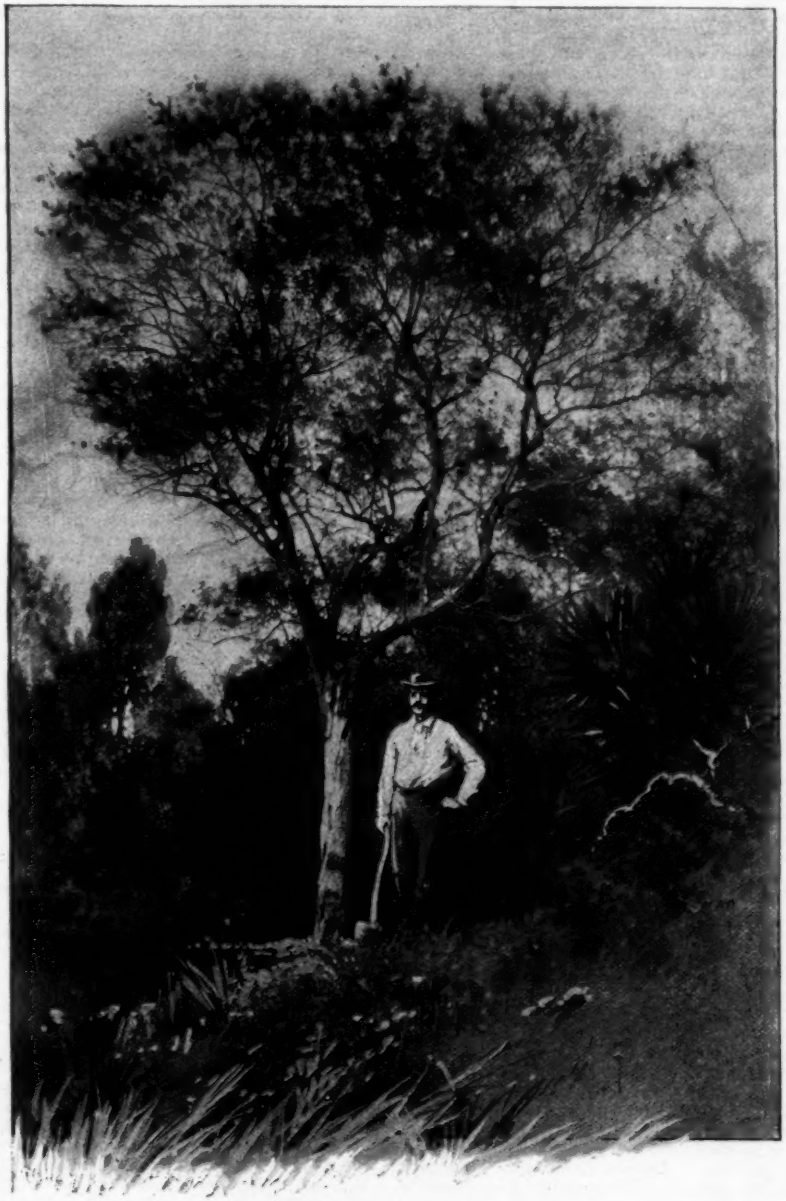

Fig. 128.—Fraxinus Greggii.—See page 447.

H. sphærocarpon,* another southern species, is hardy, though dwarf, and not very shrubby. It has large cymes of rather small flowers followed by dark brown fruit. It cannot be called a very ornamental species, and is hardly more interesting than the troublesome *H. perforatum*.

The largest fruited American species is *H. pyramidatum* which Prof. John M. Coulter, in his "Revision of North American Hypericaceæ" (*Botanical Gazette*, vol. xi, 1886, p. 83), refers to *Hypericum Ascyron* as it is found to be identical with that European and Asiatic species. It is herbaceous, and, though interesting in a general collection, is hardly ornamental. In cultivation the stems grow five or six feet high, the flowers are large with pale thin petals, and the large conical capsules are three-quarters of an inch or more long, and half an inch in diameter.

Arnold Arboretum. *J. G. Jack.*

*Since this was written, Prof. John M. Coulter, in *Botanical Gazette* (p. 200), states that *H. sphærocarpon*, of Michaux, must now be called *H. cistifolium*, of Lamarck.

Border Carnations.

THE specialists in Carnations and Picotees held their meeting and exhibition as usual this year in London, but the plain fact is that florists of the ancient type—those to whom a faultless circular outline to a flower and a smooth, flat petal are matters of momentous interest—are fast dying out, and with them the cunning art of "dressing" and "tweezering" flowers so as to make them artificially conform with the models of perfection they set up for themselves. But while we see the gradual decay of the old type, we are, at the same time, witnessing the rapid and vigorous growth of the modern florist and a flower-loving community caring less for highly bred varieties, distinguished by perfect "points," than for sorts of vigorous habit, great floriferousness, and the rich and distinct colors which characterize the modern race of border Carnations, which every year become more and more popular, not only because they are so beautiful, but because everybody can grow them without extra care and coddling. Consequently we see little or no improvement among the Flaked and Bizarre Carnations year after year, while each exhibition brings to the front numerous beautiful border varieties, rich and varied in color and with strong perfume. These self-colored sorts are infinitely more beautiful than the striped flowers, and at the exhibitions the self and fancy Carnations and the Picotees seem to win the most admirers, and at the last show this was particularly noticeable. Since the border Carnation has become such an important flower in the cut flower trade, it has been the aim of every Carnation grower to raise the best white, the best yellow, or the best scarlet, or raise some new and striking color that will take in the market. We have many good scarlets and not a few good whites, but there is still room for yellows of various shades. Pride of Penshurst, Germania and

Will Thretfall are good, but we want more pure yellows, both of deeper and paler shades. We have a host of what are called yellow-ground sorts—that is, those in which the body-color is yellow, striped or edged with red or some other tint—but these are not nearly as popular as the pure colors. Among the finest whites is Gloire de Nancy, a clove-scented sort that is now as common almost as the old Crimson Clove and the Blush Clove. Probably the greatest hit that has been made of recent years in point of color was that by the raiser of the Mrs. Reynolds Hole variety, its color being distinct from any other. It is popularly described as terra cotta, but its more definite description would be apricot red. It is among Carnations what W. A. Richardson is among Roses—a color admired by every one.

Since the above was written I have found at the Messrs. Veitch's nurseries some fine novelties. One of the most distinct new whites is Elaine, whose purity of bloom and vigor of growth is admirable. A very fine scarlet is Defiance, though it is not such an acquisition as a new white or yellow would be, since there are some splendid old sorts of a similar color. A very rich crimson sort, named William Toby, is likely to prove an extremely fine hardy border plant, being free in bloom and strong in growth, while a splendid purple is Purple King.

The Clove Carnations are the best of all town-garden sorts, and the gardens of the Thames Embankment have been enriched this season by glorious masses of the old Crimson Clove, the White Clove, and Blush Clove, the latter being the most remarkable because less common. There is much discussion about the new Crimson Clove, named Paul Engleheart, on account of its sturdiness of growth and dwarfness, which does away with the necessity of staking, which is one of the objections to border carnations. If we can get a race of dwarf Carnations of various colors that would hold up their flower-stems without stakes, it would indeed be a boon. I first saw Paul Engleheart some three or four years ago, and since then I find it has become widely distributed, even reaching American gardens. I was pleased to see Mr. Gerard's favorable mention of it in GARDEN AND FOREST (p. 332), and I hope it may lead to a wider knowledge of the plant. Other sorts of similarly dwarf growth would be welcome. Mr. Robinson, the editor of *The Garden*, is devoted to the Border Carnation, and at his garden in Sussex he grows every sort worth knowing. He offers prizes for the finest novelties so as to encourage raisers, and he receives, throughout the Carnation season, an enormous lot of blooms from all directions, but he can rarely find a dwarf habited sort like Paul Engleheart.

Kew *W. G.*

Notes on Wild Flowers.

THE Swamp Rose Mallow (*Hibiscus moscheutos*), still in bloom, is well worthy of cultivation, and in rich soil will grow to a height of over five feet. The plant somewhat resembles the Single Hollyhock, both in the measure of its growth and the shape and appearance of its flowers. We have heard it called the "Wild Hollyhock," which, we think, is a good name for it. The flower is rose-colored at first, changing to a paler hue, and nearly six inches wide. The leaves are two or three inches broad, nearly round, numerous, and form a pretty contrast with the large showy flowers.

The Button Snake-roots or Blazing Stars (Liatris) are, several of them, in flower, and their long showy spikes of purplish flowers are very pretty. *L. spicata* is the finest species we have seen. This plant grows about four feet high in cultivation, and the long, loose spikes of lightish purple flowers frequently form more than half the length of the plant. *L. scariosa* is somewhat similar in its appearance, but does not generally attain over three feet in height under cultivation. Another small species, about fifteen inches high, is *L. cylindracea*. All seem to be easy of culture. They like open sunlight and a light loamy soil. *Lobelia cardinalis* (Cardinal Flower) is one of our finest plants for cultivation. Few species equal it in richness of color. In cultivation the flowering spike is frequently over a foot long, and thickly set with its flowers. The plant is usually nearly two feet high, as seen growing naturally along our brook sides, but fully a third taller under cultivation. *Lobelia syphilitica* (Great Lobelia), also in flower, is two to three feet high, with light blue flowers in loose spikes about a foot long. The leaves are about four inches long by half an inch or more wide, and are quite numerous along the stem below the flowering spike. The plant seems to do well in either shade or sun.

The Whorled Milkweed (*Asclepias verticillata*) is nearly past flower. Under cultivation it grows about eighteen inches high, bearing in numerous small umbels its purple and white flowers. The numerous leaves are long and narrow, tapering to a pointed end. The seed pods are erect, nearly six inches long. The plant is quite pretty and easy to grow.

Cassia Chamæcrista (Partridge Pea) is an annual which, in rich soil, often grows two feet high. The plant is spreading in its habit, branching from the bottom, and bearing in great abundance its bright yellow flowers, which are about an inch wide. But the beautiful foliage of the plant, which is very delicate, is quite as much of an attraction as the flowers. The leaflets, a dozen pairs or so, have an odd habit of folding themselves up at night, and then opening out again in the morning at sunrise. It is easily grown from seed, and is a vauable plant.

Another beautiful annual is the California Poppy (*Eschscholtzia Californica*). The decumbent stems are about eighteen inches long. The foliage is a light green, delicate, and very beautiful. The flowers, which are borne in great abundance, are nearly two inches wide, bright yellow, with a reddish centre, somewhat resembling those of a yellow Calochortus. Few annuals of our choicest collections can be compared with this for beauty when grown on a rich and moist sandy loam.

Many of the Wild Asters or Starworts are now in flower, and they give us much more variety of color, though scarcely more numerous in kinds, than the Goldenrods. One of the finest is the *Aster lævis*, which generally grows from one and a half to three feet high, bearing a loose head of beautiful sky-blue flowers, which are three-quarters of an inch, or more, wide. It grows on sandy soil, and takes readily to cultivation. *A. Novæ-Angliæ* is a stout species, often seven feet high, very leafy throughout, and bearing a large corymb of violet-purple flowers about an inch wide. The plant is a very showy one when at its best. *A. ericoides*, fully a week later in flowering, has firm, light green foliage, and a profusion of pretty white flowers half an inch wide. This species grows about two feet high, and, planted in beds, forms a solid mass of fine foliage and flowers quite attractive.

The earliest Aster in this section is the large-leaved species *A. macrophyllos*. The curious root-leaves of this plant are very conspicuous, often nearly a foot long by half as wide. One point in which this species seems to differs from most others is that only a small portion of the plants flower. We often find large beds of apparently strong plants, and perhaps not more than half a dozen will be flowering. When in flower the plant is usually about two feet high, and bears a corymb of white, or bluish-white flowers. It is a desirable species, both for its foliage and flowers. *A. cordifolius* is another fine species, quite variable in size and the color of its flowers. Its prettiest forms are very beautiful, and under cultivation it attains a height of three feet or more. *A. undulatus* grows on dryer soil than most species and should be a valuable plant for dry situations. It has pretty light blue flowers, and attains a height of about two and a half feet.

Charlotte, Vt. *F. H. Horsford.*

Autumn Work in the Flower Garden.—When any alterations in the flower-garden are contemplated, many of these can always be made in autumn, and whatever is done in the way of shifting plants should not be delayed too long. The fall is the only proper time to move such early flowering plants as German Iris, Pæonies, Phloxes of the Subulata section, Narcissus, Camassias and all others that bloom in the early summer months. Plants lifted carefully at least six weeks before the advent of frost have ample time to make enough young roots to carry them through the winter, as the soil is still quite warm, and wherever it is sufficiently moist, action is by no means suspended. Lilies may now be transplanted as soon as the foliage and stems show signs of ripening, as this is the only time when they take a rest, and but a short one at that. A little later, roots will be starting from the base of the bulbs to carry them through the winter and until such time in the spring as the shoots are far enough advanced to supply their own feeders. Many failures result from planting Lilies in fall, because the bulbs have no chance to establish themselves before all growth is arrested by frost, and they are in a poor condition to meet the demand upon them in spring, when the young shoots should be produced. It is often the case that bulbs remain dormant a whole year from this cause. Any one who has grown Lilies is always in a position to report failures with some one or other of his pets, and this is not to be wondered at when it is considered that bulbs are received from their homes in all parts of the world and all are expected to thrive satisfactorily in the same spot and under the same treatment. Here in the East the Japanese Lilies grow without any trouble, but there are many of the California kinds that require

protection, and this is easily provided. They should be planted with others of the more tender kinds, such as *L. giganteum*, *L. Krameri*, *L. excelsum*, *L. longiflorum*, *L. Dalmaticum*, *L. Szovitsianum*, all near each other, where they may be shaded from the mid-day sun, and when the ground begins to freeze up a frame may be placed over them, filled with dry leaves and covered with shutters to keep out rain and sun-heat. In this way many delicate plants may be cultivated successfully. We never had *Anemone fulgens* so good as when thus treated. In the early part of May the bed was a perfect blaze of color. *Sternbergia lutea*, too, may be grown and flowered well, and many other things that cannot be trusted to the tender mercies of an Eastern winter. The frame should be removed as soon as the shoots are above ground in spring and all danger from spring frosts is passed. If the soil be heavy, and of a retentive nature, the addition of a little sand for the choicer Lilies will be an advantage, and we find powdered charcoal excellent to place around the base of the bulbs themselves. This promotes healthy root-action and assists in keeping away worms and grubs. If the soil is poor and it is necessary to add manure, care must be taken that it does not come in contact with the bulbs, which latter should first be covered with two or three inches of soil. The manure, which should be well decomposed, or, better still, decayed leaf-mould, should then be applied. In a position shaded from hot sunshine, and where tree-roots are not liable to rob the soil, it is not too much to expect that almost all the known Lilies can be successfully cultivated in a very limited space, year after year. The care and time bestowed upon these most beautiful of hardy flowers will be amply repaid by the abundance and richness of bloom and, eventually, by the increase of bulbs.

Passaic, N. J. *E. O. Orpet.*

Roses and the Larvæ of the June-bug.—Much complaint has been made among Rose-growers during the present season of the ravages of the cockchafer grub, so-called, the larva of the well-known June-bug, *Lachnosterna fusca*, and, while this is not an unusual complaint, yet it seems to be especially loud this year. More or less damage is caused by this insect to newly-planted Roses, under glass, every season, and the loss is considerable in some large establishments. In several instances brought to my notice during the past month, from two to three hundred plants have been destroyed, while the loss of valuable time during the best growing season is really of more serious importance than the money value of the plants that have been destroyed. This grub seems to do its work in a rather indiscriminate manner, apparently cutting off the plant nearest to it without any regard to its being a strong plant or a weak one, and, unless captured after the first offense, it immediately proceeds to the next plant and continues its work of destruction, sometimes spoiling four or five plants in succession. Its usual method is to cut off all, or nearly all, the roots just at the base of the plant, or else to girdle the stem down near the base. Either plan is very effectual in killing the plant, which only survives the attack for a few days.

The first sign of injury shown by a Rose, after having been bitten by this pest, is usually its wilting under the influence of sunlight, which proves that something is wrong with its roots (providing the soil be in a proper condition as regards moisture), and, when such a manifestation is made by a previously healthy plant, it is well to examine the roots at once, and make a careful search of the surrounding soil to find the grub, which is usually not far away. It is not easy to prevent this loss, although it is safer to plant Roses in a compost that has been prepared for a year or so, because the eggs of the June-bug are deposited in the grass, and, after having been hatched out, the larvæ descend a short distance into the sod. In this way they are carried with the sod to the compost heap, and, if this compost is used immediately after mixing, it is reasonable to suppose that more of the grubs are brought into the houses with it than would be brought if it were allowed to stand for a year when many of the larvæ will have finished their growth and disappeared in the form of perfect beetles. This grub being of comparatively large size (from one to one and a half inches in length), is readily seen among the compost, and should be watched for when the benches are filled or the beds made ready for planting. In this way many may be destroyed before they have a chance to do injury, and the slight additional labor will save many plants, besides preventing the discouragement which is sure to visit the grower as one after another of his young Roses suddenly fails while it is making an apparently vigorous growth.

Holmesburg, Pa. *W. H. Taplin.*

Orchid-Culture, Past and Present.—A very interesting paper bearing this title was read by Mr. Harry J. Veitch, of Chelsea, at a meeting of the Royal Horticultural Society, on June 11th last, and is published *in extenso* in a recent issue of the Society's Journal. A perusal of the same is not only interesting, but very instructive, and, among other things, reminds us that the commencement of what may be called the period of modern Orchid-culture dates from only a quarter of a century ago. Prior to that period, cool treatment was practically unknown, and cool Orchids were killed off as rapidly as imported by the incredible folly, persisted in, of cultivating them in hot stoves, in a climate to which they were as great strangers as to our severest winter frosts. It was in 1863 that three different collectors were sent out to New Granada to obtain living plants of the beautiful Odontoglossums of that region, which were then chiefly known from dried specimens. A few species had previously appeared in cultivation, *O. bictonense* being the first to reach England alive, as early as 1835; but it was not until the later period, when the conditions under which these Alpine Orchids grow became understood and imitated in gardens, that the Andean Odontoglossums became common in cultivation. The same may be said of cool Orchids generally, and what a large proportion of them modern collections contain is patent to every one. If the cultivators of an earlier period could see some of our best modern collections, how great would be their astonishment and admiration.

Half a century ago a considerable number of Orchids were successfully cultivated, most of them, however, found at low elevations in the tropics, and for these, warm houses must be provided at the present day. But a little earlier in the century profound ignorance as to the requirements of an Orchid seems to have reigned, and it is very instructive to observe the gradual evolution of our modern system of culture.

The earliest recorded instance of the flowering of a tropical Orchid in Great Britain dates from over a century and a half ago, but is not mentioned by Mr. Veitch. It appears that Peter Collinson received a dried specimen of *Bletia verecunda* from Providence Island, in the Bahamas, in 1731, and not despairing of life in the tuber, sent it to the garden of one Wager, where it was placed in a warm bark-bed during the winter, and produced its flowers during the following summer. In this single experiment we may see the germ from which modern Orchid-culture has been developed.

The Vanilla appears to have been established in cultivation prior to 1768, being mentioned in the second edition of Miller's Dictionary of Gardening of that date, but of Epidendrum the same author remarks that "the plants cannot by any art yet known be cultivated in the ground, though, could they be brought to thrive, many of them produce very fine flowers of uncommon form." Three species sent from America were planted with care in pots and placed in a stove, where they flowered, but soon afterward perished. *Phajus grandifolius* and *Cymbidium ensifolium* were introduced from China about 1778; *Epidendrum cochleatum* first flowered in this country in 1789, in the Royal Gardens at Kew, where also flowered *E. fragrans* in October of the following year. In 1794, fifteen species, chiefly West Indian Epidendrums, are recorded as being in cultivation at Kew, "in very great heat, and with fragments of half-rotten bark at their roots." A number of species from temperate regions were introduced previous to this date, but these may here be passed over.

The first Epiphytal Orchids received in England were brought from the West Indies by naval officers and captains of the merchant service, who gave little information respecting them beyond the fact that they grew on trees. Hence they were believed to be parasites like the Mistletoe, as will appear from a note by the editor of the *Botanical Register*, when figuring *Epidendrum nutans*, at plate 17. He there remarks: "The cultivation of tropical parasites was long regarded as hopeless; it appeared a vain attempt to find substitutes for the various trees each species might affect within the limits of a hot-house."

Messrs. Loddiges, of Hackney, who commenced the cultivation of Orchids for sale in 1812, were among the more successful cultivators of the period, and it is interesting to note their methods. The compost was made of rotten wood and moss, with a small quantity of sand. The Orchid-stove was heated by brick flues to as high a temperature as could be obtained by that means, and by a tan-bed in the middle, kept constantly moist by watering, from which a steamy evaporation was rising at all times, without any ventilation from without. Well might it be remarked that it was as dangerous to health and comfort to enter one of these houses as it was into the damp, close jungle in which all tropical Orchids were then supposed to have their homes; and no wonder they seldom lived long

under such treatment. England could not well be anything else than "the grave of Orchids" until a more rational system was adopted. We hope to return to this interesting subject in a future article.

London. *Calypso.*

The Vegetable Garden.—Lettuce-seed sown now will give plants in time for setting in cold frames before winter comes, and, if the winter be not too severe, many of the plants can be used before spring, for they will grow if only protected from frost. Spinach, for early spring use, should also be sown now. After the plants are of good size, and before hard weather sets in, a mulch of manure will be beneficial. A few plants of Watercress may be set in a frame where the soil is damp, and, if the frost can be excluded, they will make a new growth, which will prove an agreeable relish in winter.

The Forest.

The Douglas Fir in Scotland.

AMONGST the exotic timber trees which have been introduced into Europe during the present century, the Douglas Fir has attracted more notice than any other species, owing to its remarkably quick growth during early youth. Specimens growing in free positions are believed to have laid on a mean annual increment of as much as three cubic feet, while only one cubic foot, at the outside, could be expected from a Larch tree; and even in a few fully stocked woods the increase appeared exceedingly great.

More than a year ago a Scotch paper drew attention to the oldest pure wood of Douglas Fir, situated at Taymount, in Perthshire, on the estate of the Earl of Mansfield. The plantation in question was spoken of in glowing terms, but only a few scanty measurements were given, so that it is difficult to arrive at any definite idea on the progress of the plantation, whereby it can be compared with that of indigenous timber trees.

Such general statements are often misleading, and therefore a correspondent of the *Gardeners' Chronicle*, no less an authority than Mr. W. Schlich, late Inspector-General of the India Forest Depot, measured, in July last, a sample plot in the Taymount plantation, and also measured, by way of comparison, a sample plot in an adjoining Scotch Pine plantation. The results of these measurements are not only of interest to forest-planters in Scotland, but they well illustrate certain general principles which should be borne in mind by planters in every country who propose to plant forests of exotic trees.

The plantation of Taymount is situated in 56½° northern latitude, and at an elevation of about 200 feet above the level on the sea. The locality may safely be set down as of the best quality for the growth of trees. The rainfall is placed at twenty-eight inches annually. The area of the plantation amounts to eight acres, and was planted in the spring of 1860, in the following manner: Douglas Fir, four years old, nine by nine feet; Larch, four years old, one between every two Douglas Firs, and an additional line between every two lines of Fir, so that the plants stood four and one-half by four and one-half feet, each acre containing 2,151 plants, of which 538 were Douglas Fir and 1,613 Larch. The plants of Douglas Fir were two years' seedlings and two years' transplanted. The plantation took a good start, and the Firs are said to have taken the lead at once. The Larch were gradually thinned out, until the last disappeared before the year 1880, since which time the plantation was one of pure Douglas Fir. The first regular thinning of the Douglas Fir occurred in 1887. Before that thinning about 277 trees remained per acre, the remaining 261 having gradually disappeared during the previous twenty-seven years. Of the 277 trees, seventy-five per acre were thinned out in 1887, so that now, in 1888, the countings showed 202 trees per acre.

On a sample plot of average appearance all the trees were measured at a height of four feet six inches from the ground, and a selected tree was felled and its cubical contents accurately determined. Without giving the tables in detail, it appears that the sample tree could be taken as equal to the average tree in all dimensions, and estimating its growth, the result showed that, leaving out of account the amount of wood removed in previous thinnings, an acre of Douglas Fir had given an annual increase, during the twenty-eight years since the trees were planted, of 133 cubic feet of wood.

By way of comparing these results with the production of an indigenous tree, the trees on a sample plot of one-tenth of an acre—in a very uniform plantation of Scotch Pine, situated at a short distance from the Douglas Fir plantation—were measured. This Scotch Pine plantation had been established in a somewhat elevated spot, which was formerly of a swampy description. The locality is of second quality only, compared with the locality in which the Taymount Douglas Firs grow. It was drained and planted in 1847—that is, forty-one years—with four years' old plants of Scotch Pine; it has been thinned four times.

The result of the careful survey showed that an acre of Scotch Pine had given an annual production of 122 cubic feet of wood, against a production of 133 cubic feet made by the Douglas Fir. This difference is not great, and it is less important than it appears, when we consider that the quality of the soil in the Scotch Pine wood is decidedly inferior to that of the soil in the Douglas Fir wood.

Unfortunately, Mr. Schlich had no opportunity of measuring a Larch wood in the vicinity of Taymount, but it is well known that, up to an age of forty-five years, at any rate, Larch produces a greater volume than Scotch Pine, so that he does not hesitate to say that, "If grown in a well stocked or crowded wood and in localities of equal quality, Douglas Fir is not likely to produce more solid wood during the first thirty or forty years than the Larch, and probably, also, not more than the Scotch Pine."

The explanation is, that although the individual Douglas Fir develops more rapidly in diameter and in height than a Scotch Pine or Larch, it requires, at any rate in Scotland, much more space; and, consequently, an acre of land will hold only a much smaller number of trees. Moreover, the stem is more tapering than those of the important European conifers.

On the other hand, the growing stock of a Douglas Fir wood consists of much larger trees (though smaller in number) than an equally old Larch or Scotch Pine wood, and this is a great advantage where big timber fetches higher prices than moderate-sized timber. This advantage will, however, to a considerable extent, disappear with advancing age, when the indigenous timber trees of Great Britain reach the size usually demanded in the market.

The Taymount plantation gives some valuable data for comparing the Douglas Fir with other trees in the early stages of its development; but, of course, it gives no information as to its further production. The rate of increment of various European conifers is well known, but of the Douglas Fir, even in its native home, no accurate measurements are available. Mr. Schlich proceeds, however, to gather such additional facts as he can from the following data:

(1) Two Douglas Firs, planted on the same estate, and now fifty-seven years old, are ninety feet high.

(2) Dr. Mayr found the tree in its best estate in the moist valleys of the Cascade Mountains, where the average height of full-grown mature Douglas Firs, grown on soil of the best quality, amounts to 213 feet, with a diameter of six and a half feet, measured at six and a half feet above the ground. In the same locality, on gravelly soil, the trees only reached an average height of 148 feet, and a diameter of two and six-tenths feet. Again, in the Rocky Mountains, in Montana, at the same elevation and degree of latitude as on the west coast, the Douglas Fir reaches, on best soils only, the same dimensions as on the gravelly soil of the Cascade Range Mountains—that is to say, a height of 148 feet, and a diameter of about two and six-tenths feet. The part of the Cascade Range where the Douglas Fir grows has an annual rainfall of about thirty inches, while in Montana only twenty-four inches fall, and Dr. Mayr believes that the development of the Douglas Fir is proportionate to the rainfall.

(3) A cross-section of a Douglas Fir was sent from America for exhibition in Europe; it was then made over to Kew, and by the kindness of the Director was lately presented to the Cooper's Hill Forest Museum. The section shows a total diameter, including the bark, of seven feet nine inches, and the counting of the concentric rings indicates a total age of 515 years. An examination of this tree shows that it was still making good increment at an age of 515 years, which is higher than that usually attained by the European Larch, Scotch Pine, Spruce and Silver Fir. Secondly, it shows that the enormously rapid increase of the diameter during the first twenty-five years is suddenly followed by a much smaller and an approximately even increment during each of the following nineteen periods of twenty-five years. Thirdly, that the sectional area increases, on the whole, steadily. The periodic increment increases up to the age of 400 years, when it commences to fall. Taken by centuries, the fourth century yielded the largest increment. And finally, the rate of growth indicated in the section up to the year thirty resembles that of the average tree in the Taymount plantation in a striking degree.

So far, then, the trees in Scotland may be considered to have done as well as those of the same age, under good conditions, in their native home. Assuming, therefore, that they will continue to increase as rapidly as did the great tree whose section was sent to Kew, the conclusion is reached that under a rotation of seventy-five, and perhaps of eighty, years, the Larch will yield as much solid wood as the Douglas Fir whenever they are grown in regular, fully stocked woods, and in localities of equal quality—with this difference, that the material yielded by the Douglas Fir will consist of a smaller number of trees per acre, with a greater mean diameter per tree.

It may be added that the Douglas Fir would yield a larger amount of wood in a rotation of from 100 to 120 years than it would in a longer or shorter rotation. The difference, however, would not be great, and planters are not inclined to wait so long for returns.

As to the quality of the timber, the wood of the Douglas Fir has a great reputation, and in America its quality is believed to be equal to that of Larch timber. In how far the Douglas Fir grown in Scotland will come up to that standard remains to be seen. The larger sized trees so far cut on the Scone estate have been freely bought at the same rates as those usually paid for Larch, but sufficient time has not elapsed to show the comparative merits of home grown Douglas Fir and Larch timber.

As to the safety of production, it is an undisputed fact that Douglas Fir can, in Scotland, only be successfully grown in sheltered localities, because its leading shoot, and even the lateral branches, are very liable to be broken by wind. This reduces the area suitable for its cultivation very considerably. Then there can be no doubt that the Douglas Fir, in order to yield large volume returns, requires good, fertile, and fresh, or moist, soil—in fact, soil on which any other species will produce a large volume of timber. Such land can, moreover, be used to greater advantage for field crops. What is specially required is a tree which will do well, or at any rate fairly well, on lands which are not suitable for field crops.

Finally, it has been said that the Douglas Fir is not exposed to any disease, while the Larch, for instance, suffers so much in this respect. But it will be remembered that the Larch disease did not show itself in Scotland until about sixty years ago.

No doubt exists now that the Larch cancer is the result of the ravages of a fungus, and Dr. von Tubeuf has lately described a similar one which is parasitic on the Douglas Fir. It is found, as a general rule, that those Douglas Firs were especially attacked which grow in fully stocked areas, so that the branches of the trees interlaced; and in these cases the lower branches were more attacked than those higher up. This means that the Douglas Fir must be grown in thin, open woods, and if so, farewell to any high returns per acre, such as Silver Fir, Larch, or even Scotch Pine, will yield.

Mr. Schlich concludes by saying that there is encouragement to plant the Douglas Fir in Great Britain and Ireland, and he hopes that experiments may be continued. He only writes to sound a warning against extensive plantatations until it has been demonstrated that it really deserves to supersede species hitherto cultivated. Great things were expected of the White Pine in Great Britain, and probably the Douglas Fir will not revolutionize sylviculture in the United Kingdom. It is one thing to nurse a single tree in a fine soil and under most favorable conditions, and another to grow trees on a large scale for economic purposes. In the former case only exceptional results are seen; in the latter case averages must be looked for and reckoned with.

[The result of Mr. Schlich's investigations upon the Douglas Fir in Scotland should be carefully considered by all persons in this country interested in planting, especially by those living in the Northern States east of the Rocky Mountains, where it is believed that this tree may prove valuable in forest-planting. Little is known yet, however, of its behavior in eastern America. The young trees which were planted here first were imported from Europe, where they had been raised from seed gathered in Oregon or California. They proved hardy only in very favorable situations. Dr. C. C. Parry visited the Rocky Mountains of Colorado during the summer of 1862, and found the Douglas Fir growing there at high elevations. Seeds from these trees were sent by him in the same year to the Botanic Garden in Cambridge (with seeds of *Picea pungens*, *Picea Engelmanni* and *Pinus Balfouriana*, all discovered by Dr. Parry), and a few plants were raised. The largest of these are now more than twenty feet high, and have produced cones. A comparatively large number of seedlings have been raised in recent years from Colorado seed, and in one or two places in New England they are being tested now on a considerable scale. The young trees promise well, and grow much faster than White Pines planted in similar soil—a light, dry and very porous drift—but not as fast as European Larch. Such experiments, of course, prove nothing yet, except that the Douglas Fir raised from Colorado-grown seed is hardy in New England, while seeds from the same trees, long subjected to the moister and warmer climate of the Pacific coast, do not produce plants which can support the climate of that part of the country. The facts which Mr. Schlich brings out—that the Douglas Fir must have space in order to develop rapidly, and that it requires shelter to protect its comparatively brittle leader and branches—will no doubt prove as true in the United States as in Scotland; and while enough is not known of this tree to justify any one in believing that it is more valuable than the White Pine or some other native trees, or in planting it in the eastern part of this country upon any large scale, there is enough known to make further experiments with it in forest-planting very desirable. As an ornamental tree, few hardy Conifers, of course, can equal or surpass the Douglas Fir.—ED.]

Correspondence.

Storage-Reservoirs for Irrigation.

To the Editor of GARDEN AND FOREST:

Sir.—I was greatly interested in the article on "Mountain Reservoirs and Irrigation," but, in considering the danger of fatalities from broken dams, it should be remembered that the conditions under which reservoir-construction is to be undertaken in the arid region are radically different from those which obtain at the East. Remembering, too, that the average annual rainfall in the arid region is less than twenty inches, and that this is spread over the entire twelve months, it will be seen that the danger from such a tremendous downpour as that which caused the Johnstown disaster is quite remote. Excessive and sudden cases of rainfall are of rare occurrence in California. In that portion of the state in which irrigation is required, the average rainfall does not exceed twelve inches annually, or one inch a month. Under such circumstances, a dangerous precipitation is well nigh impossible.

But the builders of the reservoirs now in existence have taken care to guard against any contingency on this account. These reservoirs are never established in water-courses liable to heavy floods. The most expensive affair of the kind in California is the immense reservoir known as Lake Yosemite, in Merced County. This is fed from the Merced River, a stream familiar to all visitors in the Yosemite Valley. Instead of being formed by the damming of that stream, this reservoir is situated at a distance of several miles from it, occupying a depression in the foot-hills. It is supplied with water through a canal 100 feet wide and ten feet in depth, and the flow of water is regulated by a massive and substantial system of head-gates, by which at no time, even when the water in the river is at its highest, can more than is desirable find its way into the reservoir. The lake, as it is called, was formed by the construction of an earth embankment, 4,000 feet long, across the lower side of a depression in the rolling foot-hills. This embankment is 250 feet thick at the base, and tapers gradually until, at the crown, the width is twenty feet. The highest point is some sixty feet above the plain below. The water-face of the embankment is rip-rapped so as to prevent erosion. It is estimated that over 300,000 acres of land can be irrigated from this reservoir, upon which something like two million dollars was expended.

The most remarkable irrigation storage reservoir in the state is that at Bear Valley, San Bernardino County. This occupies the site of an ancient lake, high in the San Bernardino range of mountains. By some convulsion of nature the mountain that walled in one end of the lake was riven, and the water escaped through a narrow and tortuous channel toward the sea. By throwing a dam across this chasm the valley was again filled with water from the winter rains and snows, which was utilized for irrigation in the valley twenty miles away. The only sources of supply are three or four rivulets, too small to be called brooks. There are never any violent storms which might cause the water in the reservoir to rise at such a rate as to be dangerous to the dam, which is a massive arched stone

structure, with abutments dovetailed into the solid mountain. This dam is remarkable as being the first adaptation of this arch principle in the United States. The gorge where it is located is perhaps seventy-five feet wide at the base, with rocky walls sloping to 300 feet at the summit. The dam is a granite and cement wall, arched up-stream with a radius of 335 feet. It is sixty feet in height, and with the water at the fifty-foot mark, it forms a lake five and a half miles long and from half a mile to a mile and a half in width.

A structure of similar character is the Sweetwater dam in San Diego County. This, too, occupies a narrow gorge, behind which lies a wide valley traversed by a small stream. Such a thing as a flood or dangerous rainfall has never been known here.

It should be remembered, too, that these reservoirs are constructed fully as much to distribute water as to preserve it. It is of the first necessity, therefore, that the means for drawing off the water shall be equal to those for holding it. Consequently, if there should be the least apparent tendency toward overflow, it is an easy matter to open the outlets and at once afford egress for any surplus water that may accumulate during seasons of extraordinary rainfall. The schemes of reservoir projectors do not contemplate the damming of streams which are subject to danger from overflow. Where such must be utilized, it will be after the manner pursued at Mercer, where the flow from the river can be regulated to an inch.

San Francisco. *G. F. W.*

Notes.

Mr. Charles Anderson, of Flushing, considers Paul Neyron and Mrs. John Laing the only hybrid perpetual Roses which deserve to be named as autumn bloomers.

The Pecan bears abundantly, and makes a fine ornamental tree in the upper valley of the San Joaquin River, California, and the *Visalia Times* speaks of two trees in that city from seed planted nineteen years ago that are fifty feet high and seem better adapted to that climate than the English Walnut.

In the Jardin des Plantes at Paris stands an old Locust-tree (*Robinia Pseudacacia*), said to be the first one planted in Europe. It was planted in 1636 by Vespasien Robin; and now the old trunk, in its decay, is so mended with mortar and cement, that little of it can be seen; but there is life in the branches, and it may last for years.

The *Pacific Rural Press* speaks of a Bamboo grove on the grounds of General Kirkham, of Oakland, which was started twenty years ago with some plants brought from China. Every year the shoots come up stronger, and some of this year's growth are forty feet high and four or five inches in diameter. They sometimes make the growth of an eight-inch joint a day.

The Atlanta Perfumery Company is preparing to build a factory this winter in the Orange belt of Florida, where such flowers as Orange blossoms, Rose Geraniums, Roses, Yellow Jessamine, Tuberoses, Magnolias, and many other fragrant flowers can be had in large quantities. The plant will be of sufficient capacity to make use of 200,000 pounds of flowers in the season.

Professor W. F. Massey writes to the Philadelphia *Weekly Press* that when the Moravians settled the town of Salem, North Carolina, a century ago, they had the rare foresight to dedicate a large tract of Oak forest as a park forever, and this now contains trees hard to match. The great buildings of the college for girls are embowered among noble trees in a park which, for picturesque beauty, has few equals.

Dwarf White Asters were recommended for winter blooming by Mr. A. Giddings, of Illinois, at the florists' convention in Buffalo. They can be grown among Roses in beds near the glass and will bloom when only four inches high. They yield better than Carnations, and can be grown more profitably, for as soon as one lot of plants is through blooming, another can be had in readiness to take their place.

How much more at home our Pacific coast conifers are in England than in our eastern states can be inferred from a sentence or two in a description of the Pinetum at Hardwicke Hall, which appeared in a recent number of the *Gardeners' Chronicle*. After noticing a specimen of the Atlas Cedar as the most remarkable tree in the collection, on account of its remarkably rich glaucous color, the writer goes on to say: "The next tree to command notice is a Redwood *Sequoia sempervirens*, a perfect specimen, standing at least seventy feet high, and clothed down to the ground with healthy spreading branches and foliage. Near by is a Wellingtonia [which means *Sequoia gigantea*], sixty-five feet high at least, and some nine to ten feet round the trunk, and several specimens of the Douglas Spruce over seventy feet high."

The Blue Spruce is now the recognized popular name in England for the glaucous form of *Picea pungens*, which has an established reputation as one of the handsomest and, at the same time, the hardiest of ornamental conifers suitable for European gardens. The blue variety differs only from the type in the bluish color which covers every twig and leaf, giving the tree, in its finest examples, the appearance of frosted silver. It has been known in England for a few years only, but now every tree-lover is talking about it, and if he has not planted it longs to do so. A correspondent writes that at Knap Hill Nursery the tree is one of the choicest treasures, and Mr. Anthony Waterer claims to have the finest stock of it in Europe. But, as he says, there are Blue Spruces, and Blue Spruces so-called that are not blue. The Knap Hill specimens stand in long files totally distinct from any other Spruce, the perfection of symmetrical growth and of a uniform silvery hue that captivates all who see them. Apart from its landscape beauty, the tree will doubtless prove good for shelter and screen-planting in England. It possesses what is most desired, and that is a sturdy and vigorous growth, and commences to grow late in the season after damaging frosts are past. We may add that our own nurserymen are beginning to appreciate the value and probable demand for this tree. We were recently informed by one who had visited the nurseries of Robert Douglas, at Waukegan, Illinois, that the stock of Blue Spruce there, in large sizes, seemed exceptionally strong and handsome.

A series of charts of exceptional interest and value has been prepared by Mr. J. R. Dodge, statistician of the Department of Agriculture, which present graphic illustrations of certain facts in relation to the farms of the country, and their products. The first chart shows, that, taking the country over, 289 acres of every 1,000 are farm-lands, leaving 711 unoccupied. The most surprising result displayed here is the large amount of unoccupied land in the Southern, Eastern, and Middle states. Of the 289 acres of farm-lands, 153 acres are improved, 103 acres are in woodland, and thirty-three acres are unproductive, although much of the latter is capable of improvement. It is stated that in former censuses only the forest-lands in farm areas have been reported, so that it is estimated that the forest-land, including the portion not divided into farms, would approximate 250 acres to every thousand. The second chart shows the relative proportions of tillage-lands, grass-lands, woodlands, and unproductive lands in the farm area only. The range of woodlands is very wide, ranging from one per cent. in Utah, to sixty-two per cent. in North Carolina. A third chart illustrates the distribution of Corn, varying in the different states from less than ten acres to more than a hundred acres to the thousand. Similar maps show the distribution of Wheat and Oats, representing both acreage and average yield. A series of five maps illustrates the number and value of farm animals, horses, milch cows, other cattle, sheep and swine. The fourteenth chart represents the proportion of population in different states in all gainful occupations related to agriculture. Chart fifteen illustrates the value of farm-lands, showing a range in different states from $65.16 to $4.19, the general average of the entire United States being $19.02. The last chart indicates the relative proportions of proprietors, of tenants who pay rent, and of tenants who pay a share of the produce, from which it appears that seventy-four per cent. of all farms are cultivated by their owners. The rate of yield of the three principal cereals shows so wide a variation as a result of climatic adaptation, different soils, and methods of culture, that the charts illustrating these facts are worthy of special study, while the average values of farm-stock in different sections are equally suggestive of differences in breed, degree of improvement, and the effect of distance from market. The results here set forth in this graphic way are certainly worthy of such a presentation.

Catalogues Received.

WILLIAM BULL, 536 King's Road, Chelsea, London, S. W., England; Tuberous-rooted Plants and Bulbs, etc.—DINGEE & CONARD CO., West Grove, Pa.; Bulbs, Winter-blooming Roses, Lilies, Plants, Seeds, etc.—B. A. ELLIOTT CO., 54 Sixth Street, Pittsburgh, Pa.; Bulbs and Plants, with chapter on "Fall Garden Work."—THOS. JACKSON, Forest City Nurseries, Portland, Me.; Evergreens, Trees, etc.—E. H. KRELAGE & SON, Haarlem, Holland; Dutch Bulbs.—LAKE SHORE NURSERIES, L. W. Carr, Manager, Erie, Pa.; Fruit and Ornamental Trees.—DR. H. SCHROEDER, Bloomington, Ill.; Grape-vines, Fruit Trees, Roses, etc.—JAMES M. THORBURN & CO., 15 John Street, New York; Bulbs and other Flowering Roots.